REMARKS

This amendment is responsive to the Office Action of April 2, 2008. Reconsideration and allowance of claims 1-11 as set forth herein are requested.

Status of the claims

The Office Action mailed April 2, 2008 examined claims 1-10. Claims 1-10 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Darrow et al., U.S. Pat. No. 5,445,151 (hereinafter "Darrow").

Specification amendments

Paragraphs of the specification at pages 3-5 are amended herein to replace references to the originally filed claims with text of said referenced claims. It is respectfully submitted that these amendments do not add any new matter. Accordingly, it is respectfully requested that these amendments be entered.

The claims present patentable subject matter and should be allowed

Claim 1 has been amended to clarify certain recited aspects. The main magnetic field is steady state (amendment supported in the original specification at least at page 5 line 30). The nuclear resonance signal is a nuclear magnetic resonance signal (amendment supported at least at page 10 line 20). It is respectfully submitted that the amendments to claim 1 are merely clarifying, and do not change the scope of claim 1.

The Office Action alleges that claim 1 is anticipated by Darrow. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference. MPEP § 2131. The identical invention must be shown in as complete detail as is contained in the claim. *Id.* It is respectfully submitted that claim 1 is not anticipated, nor made obvious by, Darrow.

Claim 1 recites generating a high-frequency magnetic field in the examination area, which high-frequency magnetic field runs essentially parallel to a steady state main magnetic field that is active at the same time. Such a field is not conventions in MR, and it is respectfully submitted that Darrow does not disclose or fairly suggest generating such a field. The Office Action cites the abstract and first claim of Darrow

as allegedly disclosing generating a high-frequency magnetic field that runs essentially parallel to the steady state main magnetic field. Respectfully, Applicants find no such disclosure.

Darrow *does* disclose generating various high-frequency magnetic fields, e.g. "rf1" generated by RF coil (203) that nutates nuclear magnetic spins of the subject (Darrow col. 3 lines 44-52), and "rf2" generated by RF coil (201) that creates a change in the longitudinal magnetization of the flowing fluid to saturate the nuclear spins to temporarily block the MR response signal (Darrow col. 3 lines 52-66).

However, "rf1" and "rf2" *cannot* run essentially parallel to a steady state main magnetic field. This is because both "rf1" and "rf2" modify the nuclear magnetic resonance. As explained in the disclosure of the present application (*not* Darrow):

> [I]nstead of the high-frequency magnetic fields known to date which run *perpendicular* to the main magnetic field, a new high-frequency magnetic field is generated which in the examination area of the MR device runs *essentially parallel to the main field* that is active at the same time. *On account of the parallel running, initially no nuclear resonance signal is excited.*
> Present application at page 2 lines 6-10 (italics added).

If "rf1" or "rf2" ran essentially parallel to the steady state main magnetic field, then it could not modify the nuclear magnetic resonance. But, Darrow expressly discloses that these fields *do* modify the nuclear magnetic resonance. Thus, they must have a substantial component that is *perpendicular* to the steady state main magnetic field.

This is consistent with Darrow's illustrated embodiments. Darrow Fig. 1 shows the catheter running along the longitudinal direction – hence, the catheter tip of Fig. 2 is oriented in the longitudinal direction. For the cylindrical MR system depicted in Darrow Fig. 1, the steady state main magnetic field also runs longitudinally. The microcoils (201, 203, 205), however, appear in Fig. 2 to be oriented with their coil axes transverse to the longitudinal direction, which would result in the generated B_1 magnetic fields being oriented transverse to the longitudinal direction.

Claim 1 further recites producing a component of the high-frequency magnetic field that is perpendicular to the steady state main magnetic field from the high-frequency magnetic field using conversion means fitted on the object, the perpendicular component being produced in the vicinity of said conversion means. As

Darrow does not disclose a high-frequency magnetic field running essentially parallel to the steady state main magnetic field, it cannot (and does not) disclose producing a perpendicular component from such an essentially parallel magnetic field.

Claim 1 further recites detecting a nuclear magnetic resonance signal excited as a result of the perpendicular component produced from the high-frequency magnetic field by said conversion means, in conjunction with a gradient magnetic field; and evaluating the nuclear resonance signal to determine the position of the object.

Darrow does disclose detecting nuclear magnetic resonance signals. However, these signals are directly excited by the coil (203), and not by a conversion means as recited in claim 1. Furthermore, Darrow discloses acquiring such measurements to measure the *velocity or acceleration of the fluid* (see Darrow Abstract and claim 1). Darrow does *not* disclose, or fairly suggest, or even relate to, determining the *position* of the *object* (e.g., catheter tip); rather, Darrow relates to measuring flow rate of a flowing ambient fluid surrounding the object (e.g., catheter tip).

Based on the foregoing, it is respectfully submitted that claim 1 is not anticipated or made obvious by Darrow. Accordingly, Applicants respectfully request allowance of claim 1 and of claim 10 that depends from claim 1.

Claim 2 recites means for generating a steady state main magnetic field in an examination area and means for generating a high-frequency magnetic field in the examination area, which high-frequency magnetic field runs essentially parallel to the steady state main magnetic field. As already discussed with reference to claim 1, the "rf1" and "rf2" magnetic fields of Darrow each modify nuclear magnetic resonance, and accordingly *cannot* run essentially parallel to the steady state main magnetic field. To the contrary, these are conventional B_1 magnetic fields that are oriented generally transverse to the steady state main magnetic field so as to strongly interact with the nuclear spins in order to modify nuclear magnetic resonance.

Claim 2 further recites a control unit a control unit for controlling the recited components such that the following steps are carried out: generation of a high-frequency magnetic field in the examination area, which high-frequency magnetic field runs essentially parallel to a steady state main magnetic field that is active at the same time, a component of the magnetic high-frequency field that is perpendicular to the steady state main magnetic field being generated by conversion

means fitted on the object, in the vicinity thereof, detection of nuclear magnetic resonance excited as a result of the perpendicular component of the high-frequency magnetic field, in conjunction with a gradient magnetic field, and evaluation of the nuclear magnetic resonance to determine the position of the object.

Darrow does not disclose a conversion means as recited in claim 2. Without disclosure in Darrow of a high-frequency magnetic field running essentially parallel to the steady state main magnetic field, there can be no motivation to provide a conversion means to generate a perpendicular component therefrom.

Further, Darrow does not disclose, fairly suggest, or even relate to determining the position of the object, which is the output of the control unit recited in claim 2.

Based on the foregoing, it is respectfully submitted that claim 2 is not anticipated or made obvious by Darrow. Accordingly, Applicants respectfully request allowance of claim 2.

Claim 3 is unamended, and recites a coil arrangement for an MR device for generating a high-frequency magnetic field in the examination area, which high-frequency magnetic field runs essentially parallel to the main magnetic field of the MR device. Darrow discloses a magnet (125), which could be viewed as a coil arrangement for generating a magnetic field in an examination area. However, the magnet (125) generates the main magnetic field of the MR device, which is not a high-frequency magnetic field.

Darrow further discloses the coils (201, 203, 205) shown in Fig. 2. These coils generate high frequency magnetic fields, but the generated high frequency magnetic fields are oriented transverse to the main magnetic field of the MR device so as to excite or modify (e.g., saturate) nuclear magnetic resonance. The skilled artisan would have no motivation to modify these coils to produce a high-frequency magnetic field running essentially parallel to the main magnetic field of the MR device, since such a field would be useless for Darrow's stated purpose of exciting or modifying nuclear magnetic resonance.

Based on the foregoing, it is respectfully submitted that claim 3 is not anticipated or made obvious by Darrow. Accordingly, Applicants respectfully request allowance of claim 3.

New **claim 11** recites a magnetic resonance system comprising: a main magnet generating an essentially homogeneous, steady-state main magnetic field in an examination area in a main magnetic field direction [supported at least at page 5 lines 30-31]; a first radio frequency coil arrangement configured to radiate into the examination area first radio frequency magnetic pulses, the magnetic field direction of which runs approximately perpendicular to the main magnetic field direction, the first radio frequency magnetic pulses being capable of exciting nuclear magnetic resonance in a subject in the examination area [supported at least at page 6 lines 7-10]; and a second radio frequency coil arrangement configured to radiate into the examination area second radio frequency magnetic pulses, the magnetic field direction of which runs essentially parallel to the main magnetic field direction, nuclear magnetic resonance not being excited in the subject by the second radio frequency magnetic pulses due to the parallelism of the steady-state main magnetic field and the second radio frequency magnetic pulses [supported at least at page 6 lines 10-13; page 7 lines 16-18].

Darrow discloses the recited main magnet as Darrow's magnet (125). Darrow also discloses the recited first radio frequency coil arrangement as any of the whole-body RF coil (140) or the local coils (201, 203, 205), each of which radiate radio frequency magnetic pulses running approximately perpendicular to the main magnetic field direction so as to excite nuclear magnetic resonance in a subject.

However, it is respectfully submitted that Darrow does *not* disclose the recited second radio frequency coil arrangement. Darrow does *not* disclose any coil for radiating radio frequency magnetic pulses running essentially parallel to the main magnetic field direction, such radio frequency magnetic pulses *not* exciting nuclear magnetic resonance in the subject due to the parallelism of the steady-state main magnetic field and the second radio frequency magnetic pulses.

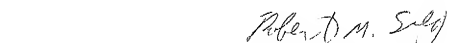
CONCLUSION

For the reasons set forth above, it is submitted that claims 1-11 as set forth herein present patentable subject matter and meet all statutory requirements. An early allowance of all claims as set forth herein is requested.

In the event that personal contact is deemed advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned at (216) 861-5582.

Respectfully submitted,

Fay Sharpe LLP



Thomas E. Kocovsky, Jr.
Reg. No. 28,383
Robert M. Sieg
Reg. No. 54,446
1100 Superior Avenue
Seventh Floor
Cleveland, OH 44114-2579
(216) 861-5582